



Policy Informs Academia: A 6-Element Framework in Disaster Studies

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Abstract This paper proposes a new conceptual framework to inform disaster preparedness research and to add a meaningful addition to established frameworks in DRR. The proposed framework is based on six elements: resources, procedures, context, risk, formation and information. This paper will discuss the characteristics of the framework, illustrating its origins in Italian Civil Protection and linkages to current international frameworks and UN definitions of DRR and vulnerability. The logic underlying this framework can help to better understand current challenges in disaster preparedness around the world and identify potential improvements to policy makers in terms of formation of the operators, information of the public, resources and procedures in my research on disaster preparedness. This paper argues that the framework could provide helpful insights into disaster preparedness in different cultural contexts, beyond its Italian origins. It is the hope of the authors that this framework will be tested in different cultural contexts to identify its weaknesses and strengths. Further research should also explore how to overcome or compensate the policy focus of the framework, to allow civil society to fully engage in disaster preparedness strategies.

Keywords: disaster preparedness, social disaster vulnerabilities, methodological framework

1. INTRODUCTION

The growing literature on the importance of “practice informing theory” in disaster studies focuses on finding new ways to translate academic knowledge into applicable real-world policy

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suggestions and advice to address the increasing climate-change induced risks and disasters (ACEDRR, 2011; Weichselgartner & Pigeon, 2015). There are examples in the literature of academia engaging with society in the form of individual researchers sharing academic results with non-academic project parties (H Doyle et al., 2015). Interchanges between practice and theory are also discussed in the form of disaster management cycles, applied to both academic research and policy implementation (Dewi et al., 2020; Poser & Dransch, 2010). Despite these tools, it seems that a systematic approach to making academic results relevant to disaster risk reduction (DRR) policy-makers is still underdeveloped. This disconnect between disaster research and policy making could lead to current obstacles in the dialogue between academia and on-the-field operators. This paper outlines a framework that allows for research on disaster preparedness to meaningfully engage with people outside of academia, i.e. the public or policy makers. The development of this framework is guided by questions on language and terminology: Q1 How can everyday policy practices help to inform disaster research? Q2 What language and terminologies can be used in different contexts, considering time and cultural differences? Ultimately, this framework is the result of the triangulation of personal insight into disaster preparedness data, discussions with disaster preparedness experts in Italy and Japan, and references to existing policy guidelines and reports, the United Nations Office for Disaster Risk Reduction (UNDRR) system and established academic disaster vulnerability frameworks.

This paper outlines how this framework was developed to facilitate the adaptation of data for inter-agent discussions, provide critically informed policy, and offer more everyday relevant research results. It represents a first step of what we hope will lead to a vibrant discussion among academics and practitioners alike on the challenges of risk assessments prior disasters and of meaningfully translating academic results into practice (Lorenzoni et al., 2022).

2. CONTEXT: INITIAL MODEL OF THE FRAMEWORK

The idea for this framework can be traced back to Italian engineer Dr Mario Moiraghi (Moiraghi, 2013, 2014a, 2014b). Result of more than fifty years of experience in public and private disaster and emergency management as General Director of Civil Protection and Emergency Coordination for the Lombardy region and consulting for other regional and national offices (1976-1996), and twenty years as President of Infosafe s.r.l., a company involved in Emergency and Land research and planning, he developed a practical model for disaster preparedness. His original model was implemented in official disaster training modules for private companies and local governments by the Italian Protezione Civile (Civil Protection Department) in the 1970s-1990s. The aim of the model was to create effective guidelines for DRR practitioners, based on local risk assessments in public and private offices, schools etc. His work and training have shaped various regional plans for disaster risk reeducation and disaster preparedness in Italy.

The original model comprised 6 elements embedded in a linear 5 steps process (Figure 1):

1. The first step is the identification of the environment, which includes environmental features (e.g., rivers, mountains, location of crucial assets, such as hospitals etc.) social norms (e.g., working hours) and social expectations (evacuation behaviour, e.g. women expected to evacuate with children).

2. The second step is the identification of risks in that context. Risks are generally identified as the intersection between three factors: a hazard (the probability of an event leading to human losses or damages to infrastructure or services), vulnerability (extent of the damage or loss caused by the event), and exposure (probability of that geographical area or social community to experience the event) (UNISDR, 2009).

3. The third step is the examination of all available resources. Resources here are used in a very broad sense and include basic material resources (e.g., fire extinguishers, water, food, drugs), organisational resources (e.g., social groups, rescue operators, local groups), and communication and infrastructural resources.

4. The fourth step is the development of procedures, defined as the ways in which existing resources (3) can be applied to reduce specific risks (2) in a certain environment (1).

5. The fifth and final step is professional training about these new procedures through information (5) of the public and formation (6) of the operators.



Figure 1. Initial model for risk assessment © author, M. Moiraghi

This model was based on the assumption that the Civil Protection Department's work can be organised similarly to a doctor's practice. A health prognosis can be divided into 5 steps: the assessment of the body condition (environment), the identification of the imbalances in the patient's health condition (risk), the assessment of the necessary treatment to re-establish a healthy balance (resources), the posology of the medicine (procedures), and finally the communication of the information of the patient (formation and information) (Interview with Moiraghi on February 2022). The association between disaster and health emergency management is not surprising, as modern disaster emergency management has been heavily inspired by the health emergencies procedures in hospitals (Kyng et al., 2006; Kyriacou et al., 2016).

From a modern DRR perspective, the main limitation of this model is the lack of civil society participation beyond their role as "victims/patients". This limitation could be explained by the fact that the model was targeting practitioners and did not mean to facilitate community engagement. We will argue that this model can be useful to frame academic research from a

policy-oriented perspective, but we suggest an adaptation of the initial practice-informed model, to include civil society and informal actors as “patients” but also practitioners in their own environments. Both groups have (underutilized) agency to influence risk and vulnerability in disaster preparedness, emergency and recovery (Acosta, 2018; Carrico et al., 2019; Kamino, 2020) and are thus included more meaningfully in the framework.

3. BUILDING A REVISED FRAMEWORK FROM EXISTING MODELS

We revised the initial model to integrate current policy and academic discussions around community resilience and disasters. To do so, after checking the relevance of the initial framework’s 6 elements ERRPIF (Environment – E, Risk – R1, Resources – R2, Procedures – P, Information – I, Formation – F), the elements were modified to include dimensions from academic and social vulnerability models.

To test the relevance of the framework in different scenarios, we looked at the robustness and feasibility of the 6 elements in current disaster preparedness studies through a policy review and an academic analysis. The policy review was conducted through document analysis of current policy briefs across cultures and stakeholders, testing for the presence of the ERRPIF elements (Section 3.1). The academic analysis integrated the ERRPIF framework with existing models of social vulnerability to allow for a more contemporary view of disaster preparedness (Section 3.2). Finally, we reframed the original model to develop a revised framework by adapting the inclusive definition of the ERRPIF elements into existing UNDRR definitions of: disaster risk assessment, disaster management and disaster preparedness (Section 3.3).

3.1 Current Policy Models

To test the relevance of the model at policy level, three reports from different agencies and countries were considered: a disaster management report from the Major’s Office of Fukuoka City on the Kumamoto earthquake (Takashima, 2016); an international report on the Role of Women in DRR in Japan by the Asia Pacific Economic Cooperation (Takeuchi & Shaw, 2008); and the Post-Disaster Risk Assessment Report Produced by the World Bank (WB) in the aftermath of the earthquake in 2015 in Nepal (World Bank Group, 2015).

1. The 2016 Kumamoto Earthquake Report (KER) shows a narrow disaster management perspective on Fukuoka City’s disaster relief activities in the areas affected by the disaster (Takashima, 2016). The report emphasises the process of risk assessment and disaster emergency procedures after the 2016 Kumamoto Earthquake. The document illustrates the process of: establishing priorities (R1) (saving lives and communication, p.3 and p.5), dispatching resources (R2) (volunteers from Fukuoka City to Kumamoto, p.5), establishing

new procedures (P) (LINE groups, p.10), enforced through training of the volunteers (F) (p.10-11).

2. The Report Women in Times of Disaster Gender and Disaster Risk Reduction: Perspective from Japan (WTD) (Takeuchi & Shaw, 2008) is an example of the multi-faceted nature cultural environments. This report focuses on the identification of the social environment of Japan from a gender (E) and compound risk perspective (R1). It also suggests policy changes to address these risks in the form of information and training (IF).

3. A post-disaster needs assessment, carried out by the WB in Nepal in 2015 (WBN) (World Bank Group, 2015), represents a standard policy-based example. The “Pre-disaster context and Baseline” section (p.7-10) shows high similarity with the Environment and Risk factors of the original model (E R1). The report focuses on the institutional (“policies on housing and settlements-land-tenure related issues”-), social (“urban settlement and population influx”), physical (“urban planning and development), and historical (“house construction process and building typologies”) aspects of environment and risk. Furthermore, the report stresses the importance of Information and Formation (IF): “Training in Seismically appropriate construction as well as repair and retrofitting of existing damaged buildings for artisans, supervisors and engineers accompanied by awareness generation in the communities should be an integral part of the reconstruction strategy.” (p.30). Finally, the “capacity-development through training” (p. 22) and the “House Owners Awareness Program” (p.23) are examples of the importance of local specialist formation and resident information to be considered a crucial aspect to shape local procedures and introduce new resources (R2 P).

These examples show that the logic of the framework can be utilized in current policy evaluation. In particular, it was illustrated that the reports’ analyses on the links between environment and risks (KER-WTD-WBN), as well as possible solutions in terms of new resources and procedures and/or information of the public and formation of rescue operators (WTD-WBN), is a meaningful addition to current DRR research.

3.2 Social Vulnerability Models

The initial model by the Italian Civil Protection expressed the centrality of practitioners and the individuality of victims. Also, the practical model was developed without multi-stakeholder involvement and academic testing for robustness. These aspects limit the relevance of the model, especially since disaster studies proved the importance of community relations in assessing risk and establishing mitigating strategies (Asgarizadeh & Gifford, 2022; Bajek et al., 2008). To ensure that the ERRPIF elements are applicable in current academic studies and reflect cultural and social differences, they ought to be thought as containers that can be filled with dimensions relevant to different cultural and time contexts (Baars, 2015). A possible way to adapt the framework is to integrate dimensions from current disaster models of social vulnerability and academic frameworks. For comprehensiveness, we chose the MOVE model

(Methods for the Improvement of Vulnerability in Europe), as discussed by Jackson and colleagues (Jackson et al., 2017), studies on social resilience (Haavik, 2020), equity and community diversity (H Doyle et al., 2015; Saja et al., 2018), and community and training engagement (Jackson et al., 2017). The MOVE model included 7 dimensions of vulnerability - Historical, Social, Economic, Physical, Cultural, Environmental, Institutional -, which can easily be considered dimensions of environment and risk in the revised framework. The dimensions of the resources and procedures were also informed by the MOVE model and other studies on social and infrastructure resilience (Haavik, 2020). From their categorisation of social resilience, the dimensions of “capabilities”, “assets”, “networks”, and “decision-making processes” were added to the resources and procedures dimension of the revised framework. Finally, the 5 dimensions of formation and information - Personalised Knowledge; Transparent Information; Trust-based Participation; Agency in diversity; Awareness of (in)equities - were derived from studies on equity and community diversity (H Doyle et al., 2015; Saja et al., 2018) and research on community and training engagement (Jackson et al., 2017). The selected dimensions are organized in their respective elements as shown in Table 1.

3.3 ERRPIF Framework: 6 Elements and 3 Pillars

To revise the original model, it was necessary to adapt it to the UN understanding of DRR. The original model includes 5 discrete steps (see above). However, these steps do not exist in isolation but can be distilled into three pillar-concepts (Table 1):

- Pillar 1 – The identification of the characteristics of the *environment* and *risks*;
- Pillar 2 – The identification of available *resources* and *procedures*;
- Pillar 3 – The analysis on how resources and risks inform new information and formation practices.

The three pillars of the ERRPIF framework are aligned with three main concepts of DRR research, as defined by the UNDRR: risk assessment, disaster management, and disaster preparedness. Here below we will show how each UNDRR pillar-concept interacts with the corresponding ERRPIF elements.

1st Pillar: Environment and Risk

The first pillar includes the identification of the **environment** and **risks**. This descriptive pillar aims to understand the link between *environment and risk* and is strongly correlated with the UNDRR definition of disaster risk assessment: “A qualitative or quantitative approach to determine the nature and extent of disaster risk by analysing potential hazards and evaluating existing conditions of exposure and vulnerability that together could harm people, property, services, livelihoods and the environment on which they depend. Disaster risk assessments include: the identification of hazards; a review of the technical characteristics of hazards such as their location, intensity, frequency and probability; the analysis of exposure and

vulnerability, including the physical, social, health, environmental and economic dimensions; and the evaluation of the effectiveness of prevailing and alternative coping capacities with respect to likely risk scenarios.”³ The first pillar of the ERRPIF framework mirrors the UNDRR focus on the analysis of the various dimensions (physical, social, health etc.) of the environment and resulting risks.

2nd Pillar: Resources and Procedures

The second pillar focuses on the examination of all available mitigating **resources** and necessary **procedures** in DRR. This pillar is grounded in the UNDRR definition of disaster management: “the organization, planning and application of measures preparing for, responding to, and recovering from disasters”⁴. Risk assessment (Pillar 1) is the foundation of disaster management (Pillar 2). This 2nd pillar identifies *resources* that help to minimize risks and vulnerabilities identified in pillar 1. These are then grouped together to identify effective *procedures* that need to be implemented in order to promote the meaningful utilization of those resources. This pillar investigates both the existing as well as missing resources necessary to address risks and vulnerabilities.

3rd Pillar: Information and Formation

The third pillar focuses on the analysis of resources and procedures and how these can inform locally target-oriented **formation** (or training) of operators and **information** strategies of the public. This pillar corresponds to the notion of disaster preparedness as knowledge and capacity-building, defined by the UNDRR as: “[Disaster preparedness is] The knowledge and capacities developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters.”⁵. The analysis of risk assessment (Pillar 1) and disaster management (Pillar 2) can identify gaps in current disaster preparedness strategies and suggest recommendations for current formation and information strategies. Below is an overview of the ERRPIF elements, the UNDRR pillar-concepts, their originating research questions and their dimensions discussed so far.

3.4 Limitations of the Framework

The main challenges of this framework are its application in different cultural contexts and the varying roles of the local communities. Environment and risk are multi-faceted elements, and the list provided here is only a starting point. It is important to consider a wide spectrum

³ <https://www.undrr.org/terminology/disaster-risk-assessment>

⁴ <https://www.undrr.org/terminology/disaster-management#:~:text=The%20organization%2C%20planning%20and%20application,to%20and%20recovering%20from%20disasters.>

⁵ <https://www.undrr.org/terminology/preparedness#:~:text=The%20knowledge%20and%20capacities%20developed,likely%2C%20imminent%20or%20current%20disasters.>

of ERRPIF dimensions to allow the inclusion of local (contextual) views and needs. With regards to the role of citizens, the revised framework calls for policy-makers and communities to be considered co-agents in the processes of identifying relevant risks, identifying and altering resource allocation and procedures, and to address gaps in information strategies. The ability and will of policy-makers and communities to participate and collaborate in this process is crucial but a culturally and politically saturated issue, that requires to be navigated on a case-by-case basis. Finally, each ERRPIF element is willingly broad in focus to allow the framework to be explored through the addition/elimination of dimensions. This reflects the current trend, whereby each pillar-concept is developing into separate study-areas (Chakma et al., 2022). This framework represents a possible starting point to bring together different areas of DRR, but is not to be seen as an endpoint of the investigation of each ERRPIF element.

Table 1. ERRPIF framework

Pillar-concept	ERRPIF Element (policy)	Originating questions	Dimensions (social and academic)
<u>Risk assessment</u>	(1) Environment	<i>What are the features of the environment?</i>	• Historical • Social • Economic • Physical • Cultural • Environmental • Institutional
	(2) Risk	<i>What are the weaknesses of the environment? What are the sources of risks?</i>	• Historical • Social • Economic • Physical • Cultural • Environmental • Institutional
<u>Disaster management</u>	(3) Resources	<i>What are the resources to mitigate these risks?</i>	• Capabilities • Assets • Networks
	(4) Procedures	<i>Which steps need to be taken to make sure the resources are effective?</i>	• Decision-making processes
<u>Disaster preparedness</u>	(5) Information (6) Formation	<i>What type of formation/information is required to distribute the procedures?</i>	• Personalised Knowledge • Transparent Information • Trust-based Participation • Agency in diversity • Awareness of (in)equities

4. CONCLUSIONS

This paper proposed a revised conceptual framework to organise discussions about disaster preparedness between academia and policy makers in a coordinated manner.

The first question driving the revised framework was to find a practice-informed terminology that could be used in disaster research (Q1). We found that the terminology used in an original disaster preparedness model from the 1990s in Italy included 6 policy-based elements that still inform current policy-making and reporting: environment, risk, resources, procedures, formation and information (ERRPIF). We showed that ERRPIF framework can be adapted to the current understanding of DRR policy and academia based on three driving pillar-concepts of UNDRR: the identification of relevant aspects of the environment and corresponding risks (Risk assessment); the identification of existing resources and procedures (Disaster Management); and the identification of gaps and suggestions in information and formation activities (Disaster Preparedness). The second question was the application of the framework to different cultural and time contexts (Q2). The ERRPIF framework is not a one-size fits all tool. The flexibility to be adapted to various cultural scenarios derives from the nature of the ERRPIF elements not as fixed but as “containers” of meaning, to be filled at the discretions of the involved parties (academic and non-academic) through preliminary discussion with local communities and relevant academic studies.

The ERRPIF framework represents the efforts to identify a holistic and impactful framework for DRR research to contribute to the growing discussion on the transfer of data results between practitioners and scholars of disaster risk reduction (DRR) (UNISDR, 2015). This framework could have tangible benefits for DRR scholars as it facilitates the identification of disaster risks and highlights possible solutions in terms of formation/information policies and the change of resources and procedures.

Even though the scope of this work is limited we hope that it offers a useful input for future debates on how to create common frameworks between policy and academia. Future research is needed to apply this framework to different cultural social contexts of disaster preparedness to test its significance and improve its robustness. We hope that other researchers will actively engage with the frameworks to carry out meaningful research that can bridge the policy-academia disconnect and stimulate engaging discussions.

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